

HISTORY AND CONSTRUCTION OF THE RURAL ELECTRIFICATION
IN SOUTHERN MARYLAND

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SUMMARY

The congress of the United States, seeing the need of the rural communities and farmers for central station electricity, organized the Rural Electrification Administration and set aside money to be loaned by this administration to the rural communities to secure this need. Cooperative associations are formed in the area by the people who want this service. They borrow money from the R. E. A. and set up a power distribution company on a non-profit basis and serve all areas where it has not been profitable for private distribution companies to serve.

The Southern Maryland Tri-County Cooperative is an example of the type of organizations that have been set-up all over the United States. It is not a typical project, however, because of the type of customers it serves. This point makes its history very interesting.

This cooperative was incorporated in 1937 and started construction on the first section of the line and the original power plant. At first it seemed that the cooperative would fail due to economic conditions in this area, but much to the amazement of those in charge, the load increased at such a rate that new additions had to be made this year to take care of the increasing load and subscribers.

The original power plant consisted of three 110 kw. generators using Diesel engines to drive them. When the load increased, however at peak loads all three generators were loaded to rated capacity with no stand by generator for use in case of a break down. Therefore two new generators of 250 kw. each had to be installed.

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GENERAL FUNCTIONS OF THE R. E. A.

The R. E. A. was set up by Congress on June 30, 1935 for the purpose of extending light and power to those communities and farmers which had not already been served by private utilities. It is not their aim to compete with private utilities, but the main purpose is to provide power where it had not been profitable for private utilities to install lines.

Congress sets aside a certain sum each year to be loaned to Cooperatives which have been organized in districts where power is not available. The purpose of the Cooperatives is to construct power lines and power plants which will serve their district.

The reason why Congress is backing this project is that they feel that our rural population is entitled to the same conveniences made possible by the use of electricity which our urban population has been enjoying for many years. Also the farmers need electricity in order to cut production costs and increase the farm income. In 1935 only ten Ameriaen farms in every one hundred had central station electric service. In 1939 twenty-five per-cent of the total number of farms were receiving this service.

An R. E. A. Cooperative is a rural community enterprise through which the farmers provide electric service to themselves. Better stated, it is an incorporated association of neighboring farmers and other rural residents, organized democratically for

the purpose of supplying electricity to its members at the lowest cost made possible through mutual self-help and R. E. A. financing and guidance. However R. E. A. can also make loans for rural line construction to municipalities, to public power districts, and to private power companies.

The minimum cost of R. E. A. makes it indispensable to the farmers. Twenty year loans are made at 2.88 per-cent interest for the entire cost of building electric distribution lines and power plants. These lines bring energy to the farmers from the nearest source, usually a private utility, municipal generating plant, or transmission line. Additional loans, where they are needed, help to finance the wiring of the farmsteads and the installation of plumbing systems. These latter loans are on a five year basis.

In addition to making loans, R. E. A. examines the proposed rural distribution line projects for economic and engineering feasibility; it aids in perfecting organizations for both construction and operation. Engineers, contractors, and sources of power are recommended by the R. E. A.

After projects go into service, they are assisted with their problems of management and operation. R. E. A. specialists help the farmer members to make the fullest and most effective use of electricity. Field auditors examine books and give counsel on financial problems. These services not only help the farmer-users, but serve also to reduce expense and build revenues to pay out the loans.

In Maryland, up to 1935, only 6,791 of the state's 44,501 farms had been connected to central station lines. By June 30, 1939, nearly 15,000 farms were being served; however,

there were still two-thirds of Maryland's farm families without the benefits of high line service.

The R. E. A. program in Maryland is operated through two Maryland Cooperatives. They have constructed nearly four hundred miles of lines intended to serve 1,400 members.

The territory of the Southern Maryland Cooperative is devoted principally to the production of tobacco. Experiments are now being carried on to develop economical applications of electric power to the drying and curing of leaf tobacco. This, along with poultry raising and dairying, promises to use large amounts of power.

THE FORMATION OF THE SOUTHERN MARYLAND TRI-COUNTY COOPERATIVE ASSOCIATION

The Southern Maryland Tri-County Cooperative Association has a very interesting history of its organization as it has, much to the surprise of the organizers and the R. E. A., turned out to be one of the most promising R. E. A. cooperatives in the East. This project is not the typical project presented in other states, in that in most other R. E. A. projects, the area served was inhabited by successful farmers while in Southern Maryland there is very poor farming land. The types of consumer on this project are (1) Summer and week-end residents, (2) Small property owners who are employed in Washington, (3) A number of employees of the Indian Head Naval Works, and (4) The poor farmer residents. This type of consumer is different than the type dealt with in other projects.

In June 1936, Father S. J. Rudtke, of Holy Angel's Church, Avenue, Maryland, assumed the leadership in the develop-

ment of a thirty to thirty-five mile project, located chiefly in districts four and seven of Saint Mary's County. After the prospective customers had been interested to the extent that they would form a cooperative to sponsor the project, the R. E. A. requested Father Rudtke to enlarge his project in order to make it more feasible. Additional developmental work, which resulted in the addition of a number of customers along the Three Notch Road in the direction of California, Hollywood, and Pearson, was subsequently undertaken.

In September of the same year a group of residents in Charles County undertook the development of a project west of La Plata. A Project Organizing Committee headed by Mr. Wendell M. Reed was appointed. Under the leadership of the committee, the Charles County project was increased to include the southern portion of Prince George's County, County Agent P. D. Brown was very active in helping to form this project.

An analysis of these two projects showed that it would be more practical to combine them and also to develop the intervening area between Port Tobacco in Charles County and Chaptico in Saint Mary's County. The consolidated project called for the construction of 156.5 miles of line to serve 527 prospective customers. At that time it was proposed to purchase wholesale power from the Maryland Light and Power Company with a probable point of connection at Mason Springs, La. Plata or Forest Hall.

A survey was then made of the prospective customers to determine the amount of power that they would probably use. Upon receipt of the project maps, survey forms signed by the prospective customers, and other preliminary project data, the R. E. A. made its customary examination in order to determine the feasibility

of the project. Analyses were made of the tentative wholesale rate for power to be served by the Maryland Light and Power Co. Studies were also made of the legal status of the proposed cooperative organization under Maryland Laws to determine the control exercised by the Public Service Commission. The theory of the R. E. A. is that these cooperatives should not be governed by the strict laws of this commission since they are not a public utility but a group of farmers forming a cooperative to supply themselves with power which could not otherwise be obtained. Economic data relating to the project area was assembled from several sources.

In view of the high wholesale power rate proposed by the power company and the low amount of power which was to be used, as determined by the survey, some doubt regarding the ability of the project to operate on a sound self-liquidating basis arose. The doubt was very much heightened by the result of the R. E. A.'s study of economic conditions prevalent in the project area. After negotiations had been carried on with the Maryland Light and Power Co., the initial rates quoted by the company for wholesale power were decreased. The decrease, however, was not enough to make the project pay without high rates to the consumers. The only alternative was that the cooperative construct and operate a power plant, which they later carried out.

To offset the objections, the project was set up on a plan of minimum rate per customer to obtain sufficient power per mile of line. An allocation of funds was approved on November 10, 1936 making a total of \$165,000 available for the proposed project. When this allocation was granted, the R. E. A. planned to send one of its field staff into the area to make a check on the economic conditions as represented in the published material obtained

from the Department of Agriculture. This personal field study should have been made before allocation of the funds but in this case the allocation was hurried because a fear that the local utility company might shortly begin the solicitation of customer service contracts in the most densely populated areas. Without these areas the R. E. A. project would not be possible.

As soon as possible after the grant was made, a member of the R. E. A. field staff made a personal economic survey, based in part upon a careful analysis of the family budget of eighty prospective customers. In every respect the results of this study substantiated the impression which had been created by the former economic reports.

When one considered the prospective customers of this area, it was very doubtful if they would be able to purchase enough electric appliances to bring their consumption up to the required level. There seemed to be, however, a number of more substantial farms, several church establishments, etc. which could be depended upon to consume more than the average amount of power.

The local utility company opened a discussion with the R. E. A. before the allocation was made regarding the possibility of their constructing extensions into the project area, and obtaining an R. E. A. loan for this purpose. With a change of administration of R. E. A., however, this program was dropped in favor of the program presented by the Southern Maryland Tri-County Coop.

Although things looked very black for this cooperative at this time, construction was started on the line and power plant with the first loan of \$165,000 secured in 1937, the same year that the cooperative was incorporated. Morris and Wells Co. of Salisbury, Md. was awarded the first line contract and started construction under the specifications and guidance of the R. E. A.

engineers.

The load increased as shown in the following description of the power plant until today this project is one of the most promising R. E. A. developments in the East. It has, at the present time, a consumption per customer far above the average of the Eastern States. Recently a new loan of \$105,000 was secured from the R. E. A. to extend their power lines and another loan of \$55,000 for construction of the new power house and purchase of equipment. This new development brings the total line milage up to 274 miles serving 988 customers. The total loan is \$485,000 of which \$10,000 was reloaned to the consumers by the cooperative for wiring and purchase of equipment.

The largest settlement served by this cooperative is a small town, Aquasco, which has a possibility of thirty subscribers.

THE POWER PLANT AND TRANSMISSION LINES

After securing a loan of \$60,000 from the government for construction of a power plant, the Southern Maryland Tri-County Cooperative Association secured bids for the plant and started construction in March 1937. This plant consisted of three 110 kw. Ball Muncie Diesel generators of the fly-wheel type. The fly-wheel type generators are constructed with the armatures held stationary and the field poles revolved around the armature on the fly-wheel of the Diesel engine. An evaporator cooler was used on these engines.

The plant was finished and wired and the line was energized on July 23, 1938, and the plant started with practically no load. Three men in three eight hour shifts were used to start the Diesel engines and put their generators on the line whenever they were needed. These men also read and recorded all meters on the line and made reports to R. E. A. each month on the operation of the plant.

During the first eighteen months of operation of these generators, the Diesel engines developed a good bit of trouble especially in the cylinders. A new type of piston that was used in the cylinders expanded with the heat, due to their construction, and scoured the walls of the cylinders. Since the generators were guaranteed, the Ball Muncie Co. renewed the pistons and put the motor back into operation without cost to the Cooperative.

This installation used the 110 kw. generators, as stated before, turning at a speed of 300 r.p.m. and using a three phase sixty cycle generator generating 2,350 volts per phase. The generator was connected in "Y" and then connected to three 100 kva. transformers also connected in "Y" and shown in the foreground of



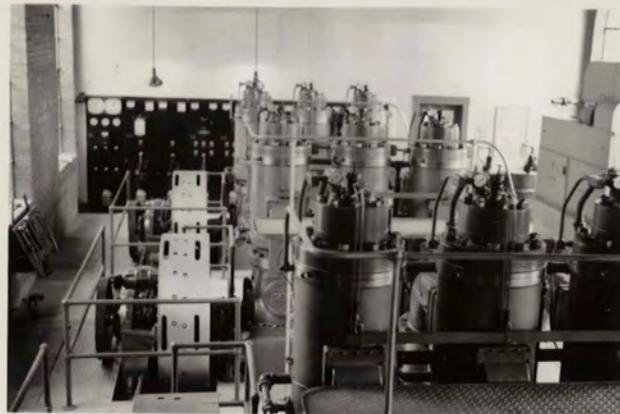
THE PRESENT POWER HOUSE

Showing the original power house and the new section on the left.

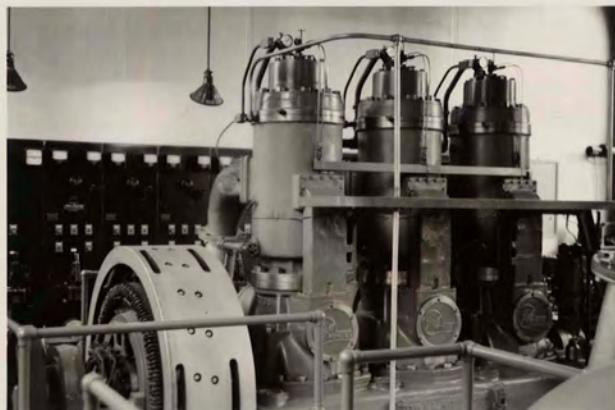


THE RIGHT HALF OF THE SWITCHBOARD

The meters on the upper right-hand corner are the voltmeters, ammeters, and the synchroscope used to synchronize all the machines in the plant. The governors of the diesel engines can be controlled from this switchboard.



INSIDE THE ORIGINAL POWER PLANT



CLOSE-UP OF THE BALL MUNCIE ENGINE

This engine has a stationary armature with the field poles fastened to the flywheel. These poles revolve around the armature.



THE TRANSFORMER BANK

The four transformers shown in the foreground are the original 100kva. transformers, one being used for stand-by service. The three new 150 kva. transformers are behind the original equipment

of the picture of the substation.

After only a year and a half of service the load on the three 110 kw. generators had grown from practically no load to almost 280 kw., which required the use of all three generators on peak load with no stand-by generator in case of a break down. In order to provide for stand-by service and to take care of the increasing load which was far beyond the expectations of the company, the Cooperative secured another loan from the R. E. A. of \$55,000 to increase the size of the plant and buy new generators and auxiliary equipment.

Contracts were made with Fairbanks Morris to supply the equipment and construct the new addition to the plant. Construction was started in November 1939 and was completed and the new generators placed on the line on March 2, 1940. The two new generators were rated at 250 kw. each which more than doubled the capacity of the plant, bringing the total capacity to 830 kw. The new larger engines are much more efficient than the original equipment as they generate from eleven to twelve kw.hr. per. gallon of fuel and the original equipment would only generate eight and one half kw. hr. per. gallon of fuel.

To take care of the added capacity the substation also had to be increased. Three new 150 kva. transformers were purchased and placed in parallel with the original transformers.

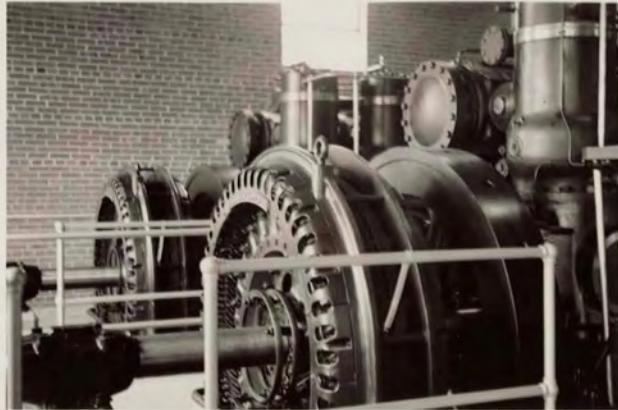
All of the generators were connected to the same bus so as to make the station more flexible. This was accomplished without any interruption in the service by the operator. One of the new generators was started and placed on the line, by-passing the switchboard, while the new connections were made.

The type of transmission line used on this project was



INSIDE THE NEW ADDITION

Both these generators are new. The one on the left is now being used as the base load generator.



CLOSE-UP OF THE NEW GENERATORS

This shows the construction of the flywheel and generators of the new units.



THREE PHASE LINE CONSTRUCTION

This shows a right angle in the three phase line with a single phase line feeding off to the right.



SINGLE PHASE LINE CONSTRUCTION

The transformer in this picture is supplying a single consumer. The voltage on this line is 6,900 volts.

the type developed by the R. E. A. engineers using high strength conductors and vertical construction. The high strength conductors permit the use of long spans while the vertical construction, on single phase lines, eliminates the use of cross arms. The single phase lines, can be converted into a three phase line when needed by the addition of a cross arm to the original poles. The line is gradually increasing in length and number of customers. At the present time the only means of regulation is at the plant and consists of a vibrating voltmeter type of control on the generator field current. The system tested by the College of Engineering and the Department of Agriculture at the University of Maryland showed very high voltage drop at several points on the line. To improve this condition it has been proposed to install regulators or to complete the third phase line where there are now only two phases of the three phase system and two systems are under study at this time.

CONCLUSION:

After the first allocation of funds for construction of this project was made and a survey made by economists it looked as though the project might be doomed to failure because of the economic conditions prevalent. The members and the head of the Cooperative have worked hard to make the project succeed and at the present time they are making it pay. If the number of subscribers and the amount of power used by each one continues to grow as it has in the past, it is thought that this project will be one of the outstanding R. E. A. projects in the East.

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INTERVIEWS

Mr. Forest Coakley, Superintendent, Southern Maryland Tri-County Cooperative Association, La Plata, Md.

Mr. H. Skone, Chief Operator of power plant, Pope's Creek, Md.

Mr. Allyn Walters, Office of the R. E. A., Washington, D. C.

Mr. Lewis C. Stephens, Office of the R. E. A., Washington, D. C.

Mr. Albert V. Krewatch, Agricultural Engineer, Extension Service, University of Maryland.